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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/806,821

03/23/2004

Tadao Yamamoto

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FRISHAUF, HOLTZ, GOODMAN & CHICK, PC

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EXAMINER

CAMPANELLO, FRANCIS C

ART UNIT

PAPER NUMBER

1709

MAIL DATE

DELIVERY MODE

05/14/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/806,821

Applicant(s)

YAMAMOTO, TADAO

Examiner

Frank C. Campanell

Art Unit

1709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8-12 and 14-18 is/are rejected.
- 7) ☒ Claim(s) 6, 7, and 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date See Continuation Sheet.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :03/09/2007 and 09/22/2006 and 03/23/2004 .

DETAILED ACTION

Claim Objections

1. Claim 4 is objected to because of the following informalities: In claim 4 the phrase "stacked in order upwardly from the heat insulator" is used. Claim one has both a heat insulating package and a support that is formed from a heat insulator, so the phrase is unclear. Suggested change would be to make the phrase "stacked in order upwardly from the support formed from a heat insulator." Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 1, 5, 10, 11, 14, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Doshi et al. (US 2003/0054215 A1)

Regarding claim 1, Doshi teaches a reforming apparatus that generates hydrogen from fuel, (Doshi Paragraph 21, Figure 2) comprising: a plurality of reactors each having an internal space and reacting fuel in the internal space; (Doshi Paragraph 22 Figures 2 and 3) a heat insulating package that contains the plurality of reactors; and a heat insulator that supports the plurality of reactors to be separated from an inner wall of the heat insulating package. (Doshi Paragraphs 22-26 Figures 2 and 3. The manifold supports the reactors away from the insulating package and can itself made of an insulator like ceramics, as stated in paragraph 31)

Regarding claim 5, Doshi teaches the reforming apparatus according to claim 1, further comprising a combustor corresponding to at least one of the plurality of reactors. (Doshi Paragraph 22, Figure 2 #106)

Regarding claim 11, Doshi teaches the reforming apparatus according to claim 1, wherein the internal space of the heat insulating package is filled with an inert gas selected from methane containing fluorine, polyhalogenated derivative gas of ethane and carbon dioxide. (Doshi Paragraph 25 teaches that both N₂ and CO₂ gas are present in the internal space. Since they are both inert gases, they would expand to fill the space.)

Regarding claim 14, Doshi teaches a reforming apparatus that generates hydrogen from fuel comprising: (Doshi Paragraph 21, Figure 2) a reformer that reforms fuel in an internal space; (Doshi Paragraph 22, Figure 2 # 102) an evaporator that evaporates fuel in an internal space (Doshi Paragraph 22, Figure 2 # 104); and a heat propagating section disposed between the reformer and the evaporator to propagate heat of the reformer to the evaporator. (Doshi Paragraph 26, Figure 2 # 104, 174, 144, 134, and 146)

Regarding claim 15, Doshi teaches a reforming apparatus according to claim 14, wherein the heat propagating section is a carbon monoxide remover. (Doshi Paragraph 26, Figure 2 # 104, 174, 144, 134, and 146. The heat propagating step is the mixture of hot gases added to the oxidizer. Oxidization of CO would cause it to form carbon dioxide and would produce heat, hence removing CO and being a heat producing step.)

Regarding claim 16, Doshi teaches the reforming apparatus according to claim 14, wherein at least one support member is disposed among the reformer, the evaporator, and the heat propagating section. (Doshi Paragraphs 22-26 Figures 2 and 3. The manifold supports the reactors)

Regarding claim 17, Doshi teaches the reforming apparatus according to claim 16, wherein a passage hole is formed on the support member and the internal

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spaces of the reformer and the evaporator communicate with each other through the passage hole. (Doshi Paragraphs 22-26 Figures 2 and 3. The manifold supports the reactors and has a number of holes with allow the evaporator and reformer to communicate with each other.)

Regarding claim 18, Doshi teaches a reforming apparatus that generates hydrogen from fuel comprising a plurality of reactors each having a continuous space in its interior and being stacked to react fuel sequentially, wherein the plurality of reactors is heat-insulated as a whole and the reactors are arranged in order of operating temperature to allow heat transmission to the adjacent reactor, respectively. (Doshi Paragraphs 22-26, Figures 2 and 3)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. Claims 2-4, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gonjo et al. (US 6159434), and further in view of Doshi et al (US 2003/0054215 A1). These two references are analogous art both concerning to production of hydrogen gas from a fuel stack to be used as fuel.

Regarding claim 2, Gonjo teaches at least one insulating support member that supports the plurality of reactors to be spaced from one another is disposed between adjacent reactors among the plurality of reactors. (Gonjo column 22, lines 39-50 and Figure 15) Gonjo does not teach the reforming apparatus of claim 1. Doshi, which is analogous art concerning a fuel cell system, teaches the reforming apparatus of claim 1 and a support member. Doshi does not teach an insulating support member. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the insulating support taught in Gonjo to the insulating package with support that separates the reactors from the heating package taught in Doshi. This would allow for optimal flow of thermal energy with little waste, (Gonjo column 22, lines 39-50) and increased efficiency, (Doshi paragraphs 11-12) directed inside the channel of the insulated support taught by Gonjo, but kept inside the insulating package taught by Doshi. (Doshi Paragraphs 22-26 Figures 2 and 3. The manifold supports the reactors away from the

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insulating package and can itself made of an insulator like ceramics, as stated in paragraph 31)

Regarding claim 3, the above 103 rejection for claim 2 holds true for the reforming apparatus of claim 2 presented in claim 3. Doshi additionally teaching the passage hole formed on the support member and the internal spaces of the plurality of reactors communicate with one another through the passage hole. (Doshi paragraph 25, holes on the manifold.)

Regarding claim 4, Gonjo teaches the plurality of reactors includes a first evaporator that evaporates a liquid mixture of fuel and water, a reformer that reforms the liquid mixture of fuel and water evaporated by the first evaporator to a gaseous mixture containing hydrogen gas, and a carbon monoxide remover that reacts carbon monoxide contained in the gaseous mixture to remove carbon monoxide, and the first evaporator, and the carbon monoxide remover and the reformer are stacked in order upwardly. Figure 15 (a), Column 22, lines 18-63.) Gonjo does not teach the insulating package of claim 1. Doshi teaches the apparatus of claim 1, including the heat insulating package. (Doshi Paragraphs 22-26 Figures 2 and 3. The manifold supports the reactors away from the insulating package and can itself made of an insulator like ceramics, as stated in paragraph 31). It would have been obvious to one of ordinary skill at the time of the

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invention to combine the two teachings to use the layout of reactors in Doshi and to combine the insulating package and support taught in Gonjo. This would allow for optimal flow of thermal energy with little waste, (Gonjo column 22, lines 39-50) and increased efficiency, (Doshi paragraphs 11-12) directed inside the channel of the insulated support taught by Gonjo, but kept inside the insulating package taught by Doshi. (Doshi Paragraphs 22-26 Figures 2 and 3. The manifold supports the reactors away from the insulating package and can itself made of an insulator like ceramics, as stated in paragraph 31).

Regarding claim 12, Doshi teaches the reforming apparatus according to claim 1. Doshi does not teach the internal space of any of the plurality of reactors partially shaped like a winding passage. Gonjo does not teach the reforming apparatus according to claim 1. Gonjo teaches the internal space of any of the plurality of reactors partially shaped like a winding passage. (Figures 10, 11, and 12 show a variety of reactors with this shape configuration.)

7. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doshi et al (US 2003/0054215 A1), and further in view of Yokota. (US 6423945 B1) These two references are analogous art both concerning the wrapping of system that needs to retain heat in an insulating package.

Regarding claim 8, Doshi teaches the reforming apparatus according to claim 1. Doshi does not teach a radiation reflecting layer formed on an inner wall of the heat insulating package. Yokota teaches a radiation reflecting layer formed on an inner wall of the heat insulating package. (Figure 4(a) #20 and column 5 lines 22-30.) Yokota does not teach the reforming apparatus according to claim 1. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the two teachings to modify the reforming apparatus's insulating package according to claim 1 taught by Doshi with the reflective layer taught by Yokota because "a radiant heat reflective member such as aluminum foil or silver paper is placed over the radiant heat intercepting member, an ever higher heat insulating effect can be obtained" is explicitly taught in Yokota.

Regarding claim 9, the above 103 rejection for claim 8 still applies as stated above. Yokota additionally teaches a radiation- reflecting layer formed out of Al and Ag. (Figure 4(a) #20 and column 5 lines 22-30.)

Regarding claim 10, Doshi teaches the reforming apparatus according to claim 1. Doshi does not teach the pressure of the internal space in the heat insulating package is set to 1 Pa or less. Yokota teaches the pressure of the internal space in the heat insulating package is set to 1 Pa or less (Figure 4(a) #20 and column 5 lines 22-30. The vacuum layer #12 is under vacuum, which inherently

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has a pressure below 1 Pa.) Yokota does not teach the reforming apparatus according to claim 1. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the two teachings to modify the reforming apparatus's insulating package according to claim 1 taught by Doshi with the vacuum layer taught by Yokota because "a vacuum layer for heat insulation" is explicitly taught in Yokota. Vacuum is well known to reduce heat transfer via conduction and convection.

Allowable Subject Matter

8. Claims 6, 7, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 6, a second evaporator found in the specific stack order listed and using the apparatus of claim 4 is not found in the prior art.

Regarding claim 7, the apparatus of claim 6 is not found in the prior art.

Regarding claim 13, the apparatus of claim 7 is not found in the prior art.

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Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 20040191591 A1

US 20040148858 A1

US 6159434 A

WO 2004037406 A

WO 200155027 A

EP 861802 A

US 20040172877 A1

US 5997594 A

US 6245309 B1

US 5897970 A

US 20030082423 A1

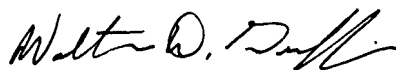
US 20030054215 A1

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frank C. Campanell whose telephone number is 571-270-3165. The examiner can normally be reached on Mon-Fri 8-5.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



WALTER D. GRIFFIN
SUPERVISORY PATENT EXAMINER

FCC